

## ABSTRACT

A semiconductor device comprises a single crystal substrate, a nucleus formation buffer layer formed on the single crystal substrate, and a lamination layer including a plurality of  $\text{Al}_{1-x-y}\text{Ga}_x\text{In}_y\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $x+y \leq 1$ ) layers laminated above the nucleus formation buffer layer. The nucleus formation buffer layer is formed of  $\text{Al}_{1-s-t}\text{Ga}_s\text{In}_t\text{N}$  ( $0 \leq s \leq 1$ ,  $0 \leq t \leq 1$ ,  $s+t \leq 1$ ) and is formed on a surface of the substrate such that the nucleus formation buffer layer has a number of pinholes for control of polarity and formation of nuclei. A method of fabricating a semiconductor device comprises the steps of: forming, above an  $\text{Al}_{1-x-y}\text{Ga}_x\text{In}_y\text{N}$  ( $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ ,  $x+y \leq 1$ ) semiconductor layer doped with a p-type dopant, a cap layer for preventing evaporation of a constituent element of the semiconductor layer, the cap layer being formed of one of AlN in which a p-type dopant is added and  $\text{Al}_2\text{O}_3$ , subjecting the semiconductor layer to heat treatment, and removing at least a part of the cap layer.

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